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STEAM/WATER THERMODYNAMICS APPLICATION PROGRAM

User Manual

Flow Computer Division

Website: www.EmersonProcess.com/flow

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SECTION 1 — INTRODUCTION

The Steam/Water Thermodynamics Application Program (more briefly referred to as the Steam Program) is a user program that, when running in a ROC or FloBoss, performs calculations of mass and energy flow based on either volumetric flow, mass flow, or differential flow, static pressure, temperature, and steam quality inputs. Mass and energy flows are accumulated using daily and monthly totals; these values are stored in the ROC or FloBoss for later retrieval.

1.1 ORGANIZATION OF MANUAL

This manual is organized into the following major sections:

- Section 1 — Introduction
- Section 2 — Downloading the Steam Program
- Section 3 — Configuring the Steam Application
- Appendix A — Point Type Listing

Section 1 — Introduction describes this manual and mentions related manuals. This section also provides an overview of the Steam Program.

Section 2 — Downloading the User Program describes how to view available memory, how to select a user program, and how to download the Steam Program to the ROC.

Section 3 — Configuring the Application provides information detailing how to configure the Steam/Water Application for a specific installation site.

Appendix A — Point Type Listing provides a breakdown of each parameter value set up in the User Data point type for the steam application.

1.2 OVERVIEW DESCRIPTION

The Steam/Water Thermodynamics Application Program provides energy calculations capability to ROC300-Series (models with FlashPAC only) and FloBoss 407 units. The software computes the "corrected" mass flow values and archives the data on hourly and daily cycles. ROCLINK Configuration Software for DOS is required to configure the calculations. ROCLINK also displays all pertinent data, including monthly mass and energy totals.

The inputs to the system are the actual volumetric flow rate, provided by a vortex flowmeter or another linear meter, the process temperature, the process pressure, and the steam quality. As a second choice, a mass flow input (corrected) can be read directly from another device. The data from this input is archived for historical purposes just like an internally calculated mass flow.

Using this program, the flow of water (chilled or hot), steam (saturated or superheated) and natural gas (orifice or turbine metered) may be measured concurrently in a ROC or FloBoss. Each flow measurement takes one of the meter runs available in the unit.

The hourly and daily averages of the process temperature and pressure, plus the mass flow and energy flow rates are available to be archived on an hourly and daily basis. The maximum and minimum values for the day are recorded for each variable archived.

The units of measurement can be configured to be either U.S. (a.k.a. English or Imperial) or metric for each steam calculation point.

For further details, refer to the specifications in Section 1.4. For more information about downloading the program, refer to Section 2. For information on configuring the program, refer to Section 3.

1.2.1 Requirements

To use the Steam Program, a ROC should have a FlashPAC installed, version 2.11 or greater. A FloBoss 407 should have firmware version 1.07 or greater. To be downloaded, the program requires available memory as described in Section 2. ROCLINK Configuration Software for DOS Version 2.23 is required for configuration.

1.3 ADDITIONAL INFORMATION

This document is intended to be used along with the following manuals to assist in downloading and configuration. The physical (hardware) aspects of the ROC/FloBoss units are contained in their respective instruction manuals, as listed below.

- 🕮 *RL101 ROCLINK Configuration Software User Manual (Form A6051)* – Part Number D301101X012
- 🕮 *Type ROC306/312 Remote Operations Controller Instruction Manual (Form A4630)* – Part Number D301059X012
- 🕮 *Type ROC364 Remote Operations Controller Instruction Manual (Form A4193)* – Part Number D301060X012
- 🕮 *FloBoss 407 Flow Manager (Form A6013)* – Part Number D301080X012

The steam and water properties calculation algorithms are contained in their respective standards, as listed below.

- 🕮 *ASME International SteamTables for Industrial Use, CRTD Vol.58, 1997*

1.4 SPECIFICATIONS

Many of the details of the Steam Program are summarized in the table below.

Specifications

MAXIMUM METER RUNS

ROC306/ROC312: 3 runs
ROC364: 5 runs
ROC407: 4 runs

COMMON FLOW PARAMETERS

Tag ID: 10-character description.

Meter Run ID: 30-character description of meter run.

Calculation Method: International Association for the Properties of Water and Steam, International Formulation 1997 (IAPWS-IFC-97). Uses either US or metric units.

Measurement Range: Pressure range is 0.1 - 2395 PSIA; temperature range is 32 - 662°F.

Meter Configuration: Live reading or manual value:

- Volumetric measurement from pulse, scaled analog, or Hart input.
- Differential pressure from analog, or Hart input.
- Pressure from analog or Hart input.
- Temperature from analog or Hart input.
- Mass flow (optional) from analog or Hart input.

Steam Quality: Live reading or manual value:

- Live reading may be from analog or Hart input.
- Manual (entered) value used in automatic override when temp/pressure is above or below the saturated steam region of the ASME Steam Table.

CALCULATION OUTPUT

Enthalpy: BTU/lbm (kJ/kg).

Enthalpy Flow Rate (Energy): Instantaneous Flow, Flow per hour, Flow per day, Energy Today, Energy Yesterday, Energy This Month, Energy Last Month. Measured in MMBTU (MJ) for steam, or in MBTU (MJ) for water.

Mass Flow Rate: Instantaneous, per hour, per day, Mass Today, Mass Yesterday, Mass This Month, Mass Last Month. Measured in MLb (tonnes) for steam, or in tons (tonnes) for water.

Density: lbm/ft^3 (kg/m^3).

Max/Min: Available through history on daily basis.

ALARMS

Low/High Alarm: Limits beyond which an alarm will be indicated.

RBX Alarm: Report-by-exception alarm call-in may be enabled.

Specifications (Continued)

MONITORED VALUES

- Station Tag
- Atmospheric Pressure (Calc, Enter)
- Elevation
- Atmospheric Pressure (Calc, Enter)
- Low Alarm Limit
- High Alarm Limit
- Units (US English, Metric)
- Pressure (Absolute, Gauge)
- Alarm Mode
- Alarm Code
- Actual Volume Input or Actual Differential Pressure
- Pressure Input
- Temperature Input
- Quality Input
- Actual Volume Rate
- Pressure
- Temperature
- Coefficient of discharge (differential mode)
- Isentropic exponent (differential mode)
- Viscosity (differential mode)
- Expansion Factor (differential mode)
- Steam Quality
- Enthalpy
- Density
- Mass Flow per Hour
- Mass Flow per Day
- Mass Today
- Mass Yesterday
- Mass Current Month
- Mass Last Month
- Energy Flow per Hour
- Energy Flow per Day
- Energy Today
- Energy Yesterday
- Energy Current Month
- Energy Last Month

SECTION 2
DOWNLOADING THE STEAM PROGRAM

This section provides instructions for installing the Steam/Water Thermodynamics User Program into ROC or FloBoss memory. Be sure to read Section 2.2, Program Requirements, before proceeding to the actual program installation.

This section includes:

- Program Description
- Program Requirements
- Viewing Available Memory
- Download Procedure

❖ **NOTE:** A PC-compatible computer must be connected to the Operator Interface port (LOI) before the downloading process is started. User program memory must be available (unallocated) in the intended download memory area.

2.1 PROGRAM DESCRIPTION

When loaded into user program memory as instructed in Section 3, the Steam/Water Thermodynamics Application Program sets up points and parameters for the calculations. The ROCLINK Configuration Software is then used to configure and monitor each of these parameters.

The program files are supplied either on a single 1.4 Mbyte diskette, or on a CD-ROM.

Note that the steam parameters are referenced in the ROC/FloBoss the same as other point type parameters—by **Type**, **Logical number**, and **Parameter** (TLP). This allows parameters such as Static Pressure to be assigned as an input to a Process Variable for a PID loop, a variable to display on a Local Display Panel, or a variable for any other ROC function. Refer to Appendix A for a complete list of the parameters associated with the Steam point type.

2.2 PROGRAM REQUIREMENTS

The Steam/Water Thermodynamics Application Program is downloaded into and run from User Program memory located either in a FlashPAC module (ROC300-Series) or in a FloBoss 407.

Requirements for the User Program:

- For ROC300-Series units, FlashPAC firmware version 2.11 or greater must be installed (check by using ROCLINK to look at the Advanced Features of the System Information display under the System menu).
- For FloBoss 407 units, firmware version 1.07 or greater must be installed (check by using ROCLINK to look at the Advanced Features of the System Information display under the System menu).
- ROCLINK Configuration Software Version 2.2 (check by using the About function in the Help menu of ROCLINK).

Based on the available memory (see Section 2.3, Viewing Available Memory) or user task requirements, select one of the programs listed below.

- **Fb_steam.h00**
  Code at memory block B8000 - BFFFF
  Data at memory block 70000 - 73FFF
  Runs out of User Task 3

- **Fp_steam.h00**
  Code at memory block D8000 - DFFFF
  Data at memory block B8000 - BBFFF
  Runs out of User Task 3

2.3 VIEWING AVAILABLE MEMORY

User program memory must be available in the intended download area (see program requirements above) before installing a user program. To view the available memory:

1. Select **Utilities** from the ROCLINK menu bar.
2. Select **User Programs**.

When you select User Programs, a screen appears that shows the unused memory blocks available for the Steam Program to be loaded. Refer to Figure 2-1.

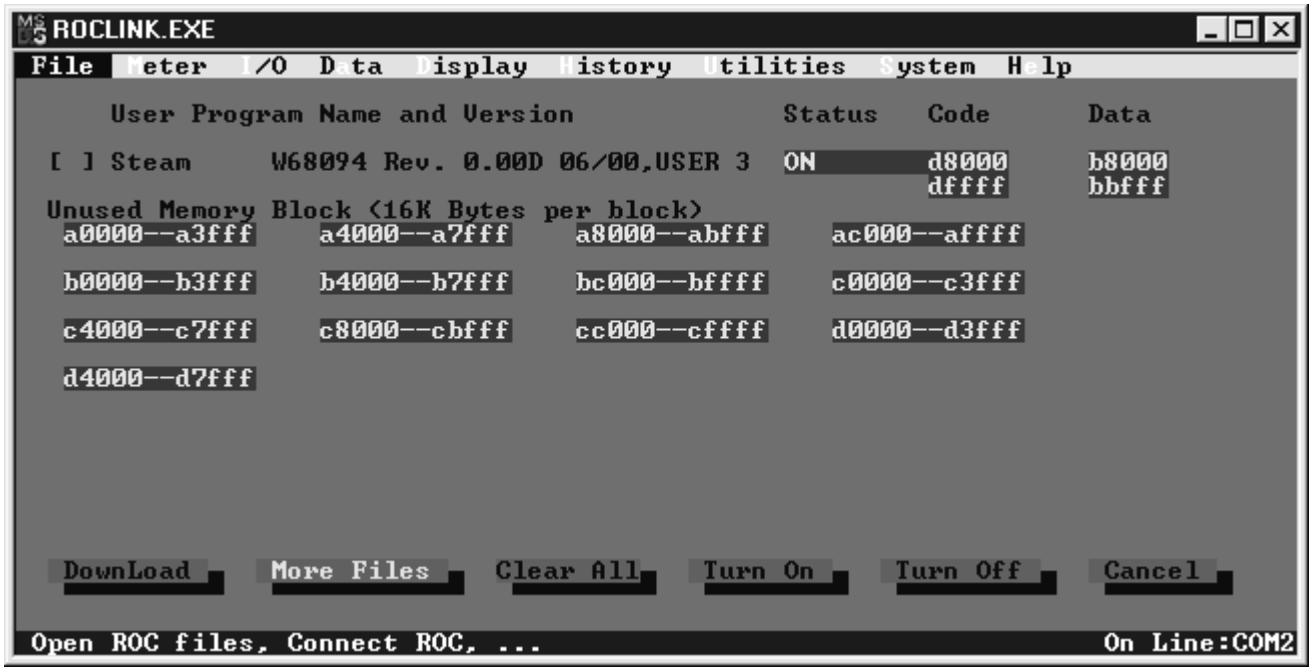
ROCLINK.EXE
File Meter I/O Data Display History Utilities System Help
User Program Name and Version Status Code Data
[ ] Steam W68094 Rev. 0.00D 06/00,USER 3 ON d8000 b8000
dffff bbfff
Unused Memory Block (16K Bytes per block)
a0000--a3fff a4000--a7fff a8000--abfff ac000--affff
b0000--b3fff b4000--b7fff bc000--bffff c0000--c3fff
c4000--c7fff c8000--cbfff cc000--cffff d0000--d3fff
d4000--d7fff
DownLoad More Files Clear All Turn On Turn Off Cancel
Open ROC files, Connect ROC, ...
On Line:COM2

Figure 2-1. Viewing Memory in ROCLINK

The memory location must be available for the User Program to be loaded. All unallocated (available) memory blocks display under this field. User programs cannot share the same memory block. Refer to the .h00 files listed in Section 2.2, Program Requirements, to determine which blocks of memory are required by the intended user program.

The other fields on this screen are described below.

User Program Name and Version — Displays the name of the User Program and the version number currently installed.

Status — Displays the run status of the User Program: ON or OFF.

Code — Code displays the location of where the program executable file resides in memory.

Data — Data displays the location of where the program data files reside in memory.

Download — When you select Download, the Open File (Figure 2-2) display appears for selecting the program files to be loaded. After you select a user program to install, you may press Enter or press Download again to begin loading the user program. Press More Files to select additional user programs for installation.

More Files — After selecting a user program to download using the Open File display, you can press the More Files pushbutton to select additional user programs to download if desired.

Clear All — Press the Clear All pushbutton to clear all user programs stored in this ROC/FloBoss out of its memory. This is typically done if you need to load a user program into a memory block already in use.

Turn On — To turn on a user program, select the check box next to the user program, and press the Turn On pushbutton. Note that the Status field displays ON or OFF to indicate the status of the user program.

After turning on a user program, perform a **Write to EEPROM** or **Write to Internal Config Memory** procedure in the ROC Flags screen. This ensures that when a Cold Start is performed, the user program automatically starts.

Turn Off — To turn off a user program, select the check box next to the user program, and press the Turn Off pushbutton. Note that the Status field displays ON or OFF to indicate the status of the user program.

Cancel — Press the Cancel pushbutton to cancel all actions and leave the User Programs screen.

2.4 DOWNLOAD PROCEDURE

Once you have determined the memory required by the desired user program is available (see Section 3.1), you may proceed to select and download the program.

To download the Steam Program using ROCLINK:

1. Select **Utilities** from the ROCLINK menu bar.
2. Select **User Programs**. Refer to Figure 2-1 on page 9.
3. Press **Download**. The Open File dialog box appears as shown in Figure 2-2.

   The **Open File** display lists the names of all the files that have the .H00 extension and are located in the default Drive and Directory. Use the Up Arrow (↑) and the Down Arrow (↓) to select the desired file in the Files list. You may change the location being read by using the Directory/Drive field. . Use the Up Arrow (↑) and the Down Arrow (↓) to select the drive containing the user program files, such as the [-D] drive.
4. When the desired User Program appears in the File Name field, click OK. The Open File dialog closes, returning you to the User Program screen.

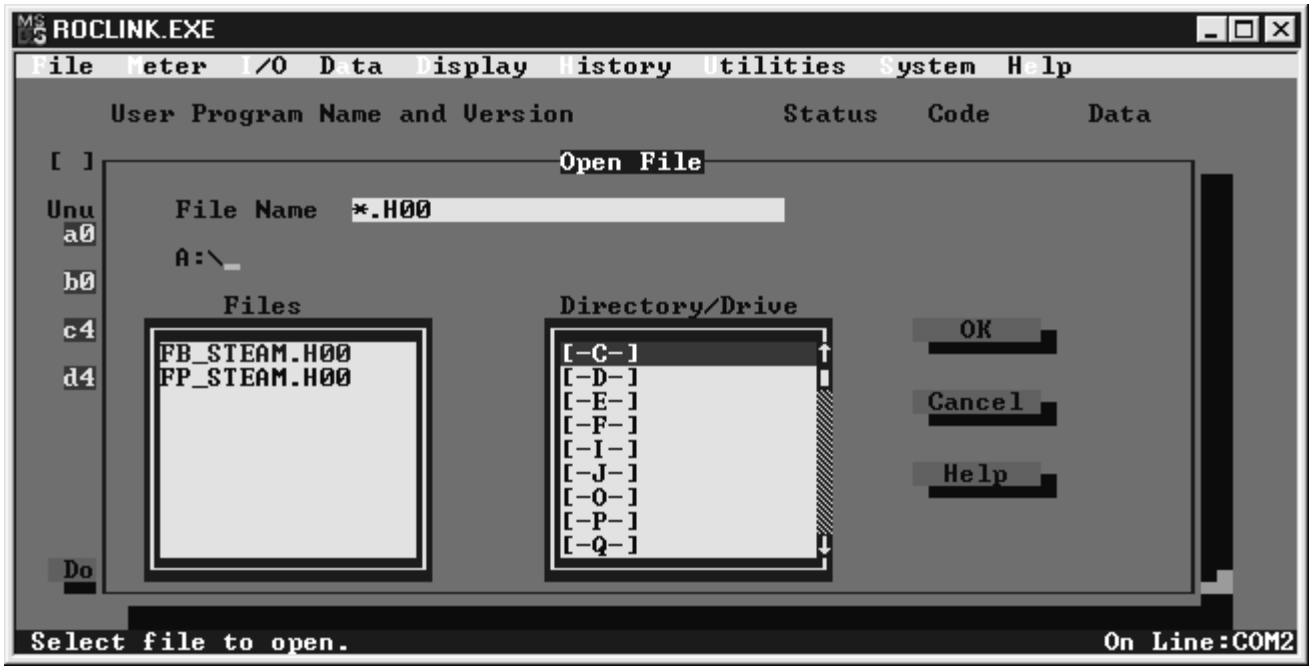

Figure 2-2. Open File

5. If you want to load other user programs as well, you may press the More File pushbutton to select them using the Open File dialog. To begin loading the selected User Program(s), press **Download** again.

   When the User Program has been downloaded, the following occurs:

   - The User Program is automatically turned ON.
   - The correct ROC Flag is automatically enabled for the User Program.
   - A Warm Start is automatically initiated.
   - A record is created in the Event Log if Log Data is enabled in the Config screen.
   - The configurable data fields are located under the User Data menu.

6. After downloading the User Program, select **Flags** from the System menu to display the ROC Flags screen similar to the screen displayed in Figure 2-3.

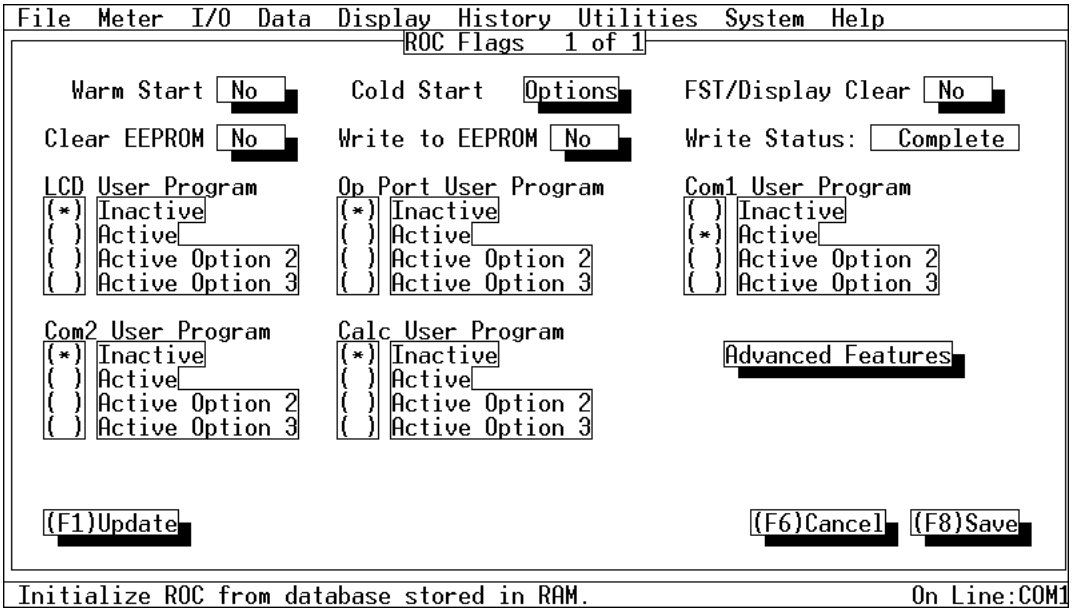

Figure 2-3. ROC Flags Display

7. Set the **Write to EEPROM** flag to **Yes**. This ensures that when a Cold Start is performed, the User Program automatically starts.
8. Press **(F8)Save**.
9. Press **(F1)Update**.

SECTION 3 — CONFIGURING THE STEAM PROGRAM

This section details how to configure steam flow points using the ROCLINK Configuration Software. Note that the flow points and their associated parameters will not be available in ROCLINK until the Steam/Water Thermodynamics User Program is downloaded as instructed in Section 2. For a detailed programmer's listing of the parameters in a steam point, see Appendix A.

3.1 CONFIGURATION

The Steam point type allows configuration of all parameters associated with the steam/water flow calculation, including inputs and alarms.

Once the Steam Program is loaded into ROC/FloBoss memory and running, Steam Calculation screens become available from the ROCLINK menus. When you select the Steam option in the Meter menu, a screen similar to Figure 3-1 appears.

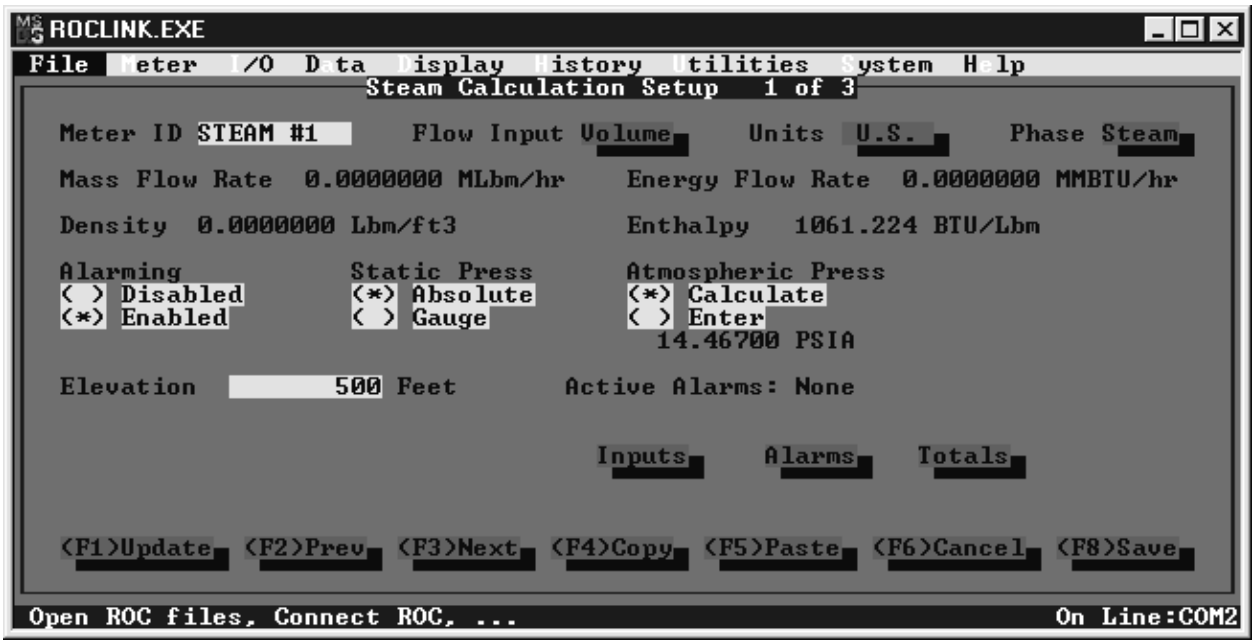

Figure 3-1. Steam Calculation Setup Screen

The Title Bar of the Steam Setup screen displays the specific number (such as 1 of 3) of the Steam Calculation point (also called a meter run) you are configuring. The number of Steam points available

varies from 3 in the ROC306/ROC312 to 5 in the ROC364. Press (F3)Next and (F2)Prev to view or configure other Steam Calculation points.

Meter ID — Ten-character name (default is STEAM #1) for this meter run that resides in the ROC/FloBoss. This name can be changed by entering a new name in the field and pressing (F8)Save.

Flow Input — Press the associated pushbutton to toggle between Volume (the default) and Mass. Unless you are connecting the ROC/FloBoss to a corrected mass flow input, leave Volume selected.

Units — Press the associated pushbutton to toggle between U.S. (the default, also called English or Imperial) and Metric for this point. The input/output conversion calculations and units (as displayed on the screen) will automatically change to accommodate your selection. The units used or expected are summarized in the table below.

Units of Measurement Summary

Parameter	Steam (U.S.)	Steam (Metric)	Water (U.S.)	Water (Metric)
Mass Flow Rate	MLbm/hr	Tonnes/hr	Tons/hr	Tonnes/hr
Energy Flow Rate	MMBTU/hr	MJ/hr	MBTU/hr	MJ/hr
Density	Lbm/ft^3	kg/m^3	Lbm/ft^3	kg/m^3
Enthalpy	BTU/Lbm	KJ/kg	BTU/Lbm	KJ/kg
Actual Volume Flow	Actual CF/hr	Actual CM/hr	Gal/min	L/min
Mass Flow Input	MLbm/hr	Tonnes/hr	Tons/hr	Tonnes/hr
Static Pressure	PSI	kPa	PSI	kPa
Temperature	°F	°C	°F	°C
Steam Quality	%	%	%	%
Alarm Limits	MLbm/hr	Tonnes/hr	Tons/hr	Tonnes/hr
Mass Totals	MLbm	Tonnes	Tons	Tonnes
Energy Totals	MMBTU	MJ	MBTU	MJ

Phase — Press the associated pushbutton to toggle between Steam (the default) and Water. Note that this selection changes only the units used (see the table above); it does not affect the calculation, which automatically changes based on the temperature and pressure (also see Steam Quality in Section 3.1.1).

Mass Flow Rate — This parameter is a monitor-only field that displays the current calculated mass flow rate for this steam point. The value is recalculated once every second.

Energy Flow Rate — This parameter is a monitor-only field that displays the current calculated energy flow rate for this steam point. The value is recalculated once every second.

Density — This parameter is a monitor-only field that displays the density of the steam or water as calculated from the measured inputs. The value is recalculated every 5 minutes unless there is a significant change in one of the inputs.

Enthalpy — This parameter is a monitor-only field that displays the enthalpy (energy content) of the steam or water as calculated from the measured inputs. The value is recalculated every 5 minutes unless there is a significant change in one of the inputs.

Alarming — Select Enabled to allow alarms to be set up for this point. The Alarms pushbutton then becomes available; see Section 3.1.2 for further information.

Static Press — Select either Absolute or Gauge, depending on the type of instrument being used to provide the pressure input for this point. Generally, an absolute measurement allows greater accuracy. If you select Gauge, then be sure also to specify Atmospheric Pressure and Elevation in the fields below.

Atmospheric Press — If you selected Gauge pressure above, then select either Calculate or Enter. If you select Calculate, then also provide the Elevation of the meter location in the next parameter. If you select Enter, then the field immediately below becomes available for editing; otherwise it simply displays the calculated value. Type in the estimated average pressure.

Elevation — If you selected Calculate for the Atmospheric Pressure, enter the elevation (in feet or meters) of the meter site in this field. The resulting atmospheric pressure is then displayed just below the Atmospheric Press selection and used by the steam point to calculate the Static Pressure in the case of gauge instruments.

Active Alarms — This monitor-only field displays any alarms that are active for this steam point: Low, High, or No Flow.

Inputs — Press this pushbutton to define the inputs for this steam flow calculation. See Section 3.1.1 for details.

Alarms— If Alarming is Enabled, you can press this pushbutton to define the alarms for this steam flow calculation. See Section 3.1.2 for details.

Totals — Press this pushbutton to display the flow totals for this steam flow calculation. See Section 3.1.3 for details.

After configuring a point and pressing (F8)Save, use “Write to EEPROM” in the ROC Flags display to save the configuration to permanent memory in case you must perform a Cold Start.

3.1.1 Inputs

To define the inputs used in this steam flow calculation, press the Inputs pushbutton in the Steam Calculation Setup screen. This displays the Inputs dialog box shown in Figure 3-2.

- **NOTE:** Interpret the information on the I/O Definition pushbutton (for example, AIN A 3, EU) in the following manner. The first part is a three-character mnemonic (in this example, "AIN" means Analog Input) that indicates the Point Type. The second part (such as "A 3") indicates the Point Number. The third part is a mnemonic indicating the selected Parameter (such as EU for the Filtered Engineering Units Parameter). Refer to Section 7 of the ROCLINK manual for a definition of mnemonics.

- **NOTE:** If you want to enter a constant value to be used as an input, type it in the Value field next to the I/O Definition pushbutton. You do not need to select the Manual point type before entering this value; the pushbutton will still read Undefined. For other point types, the field next to the pushbutton indicates the actual input value coming into the steam calculation.

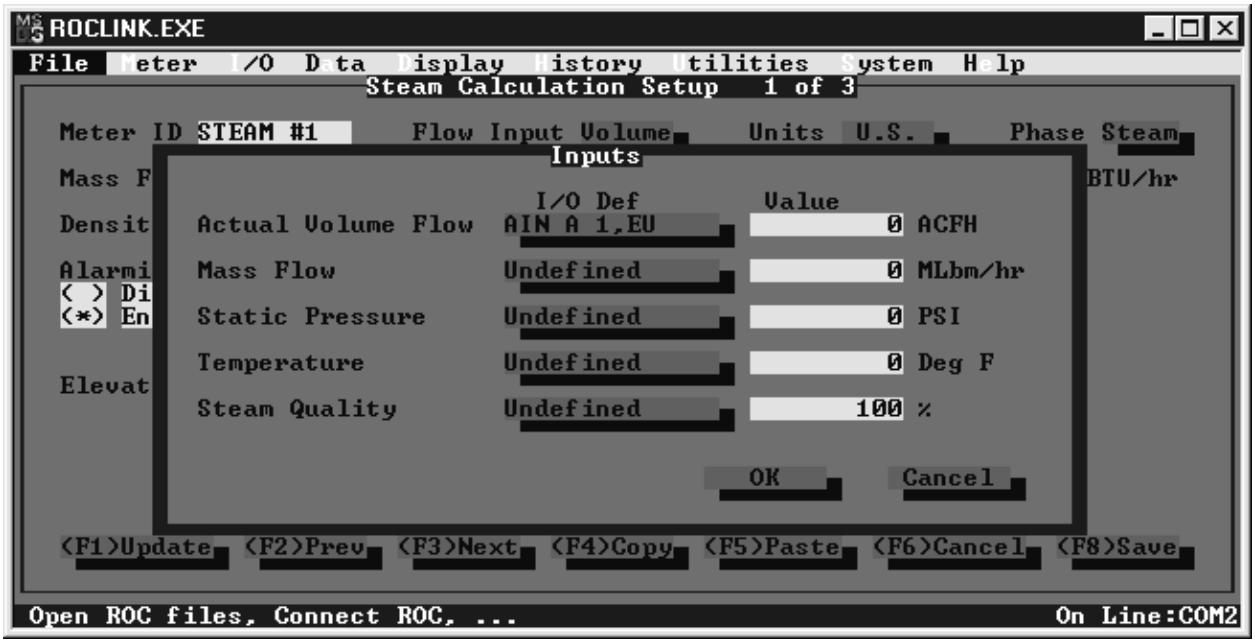

Figure 3-2. Inputs Definition

Actual Volume Flow — If the Flow Input is set up as Volume in the Steam Setup screen, identify the input from a linear flowmeter, such as a vortex meter, that measures the volume of steam or water. If you want to enter a constant value to be used as the input, type the value in the Value field to the right of the pushbutton. Otherwise, this field just indicates the current input value.

The units expected are actual cubic feet per hour for steam or in gallons per minute for water. If Metric is selected, then the units are actual cubic meters per hour for steam or liters per minute for water.

Mass Flow — If the Flow Input is set up as Mass in the Steam Setup screen, use the associated pushbutton to identify the input providing a corrected mass flow (otherwise, leave this input undefined). If you want to enter a constant value to be used as the input, type the value in the Value field to the right of the pushbutton. Otherwise, this field just indicates the current input value.

The units expected are MLbm/hr (thousand pounds per hour) for steam or tons per hour for water. If Metric units are selected, expected units are tonnes per hour for both steam and water.

Static Pressure — The associated pushbutton displays a dialog box that lets you assign the input that senses the static pressure of the steam or water. If you want to enter a constant value to be used as the input, type the value in the Value field to the right of the pushbutton. Otherwise, this field just indicates the current input value.
The units assumed for the input are PSI (kPa if Metric conversion is enabled). Be sure to

indicate the whether the pressure input is an Absolute or a Gauge measurement on the Steam Setup screen.

Temperature — The associated pushbutton displays a dialog box that lets you assign the input that senses the temperature of the steam or water. If you want to enter a constant value to be used as the input, type the value in the Value field to the right of the pushbutton. Otherwise, this field just indicates the current input value.

The units assumed for the input are degrees Fahrenheit (degrees Celsius if Metric units are enabled).

Steam Quality — The associated pushbutton displays a dialog box that lets you assign the input that indicates the quality of the steam for supersaturated steam. If you want to enter a constant value to be used as the input, type the value in the Value field to the right of the pushbutton. Otherwise, this field just indicates the current input value.

The units assumed for the input are always percent of steam. Note that if the pressure and temperature are in the superheated steam region, the Steam Quality will be forced to 100%. If the pressure and temperature are in the water region, this value will be forced to 0%.

3.1.2 Alarms

If you have Alarming enabled for this Steam flow point, press the Alarms pushbutton in the Setup screen to display the dialog box shown in Figure 3-3.

Figure 3-3. Alarms Definition

Low Alarm Limit — The limit value (default is 0), in engineering units per hour, to which the calculated mass flow value must fall to generate a Low Alarm.

High Alarm Limit — The limit value (default is 10,000), in engineering units per hour, to which the calculated mass flow value must rise to generate a High Alarm.

RBX Alarming —Select the type of RBX (automatic call-in to host) alarming you want for this alarm: Disabled, On Alarm Set, On Alarm Clear, or On Alarm Set & Clear. For RBX alarming to function, you must also set up the RBX features as described in Section 9 of the ROCLINK user manual.

3.1.3 Totals

When you activate the Totals pushbutton in the Steam Calculation Setup screen, a dialog box showing mass and energy totals is displayed as shown in Figure 3-4. Note that these values are all for monitoring only; they cannot be configured.

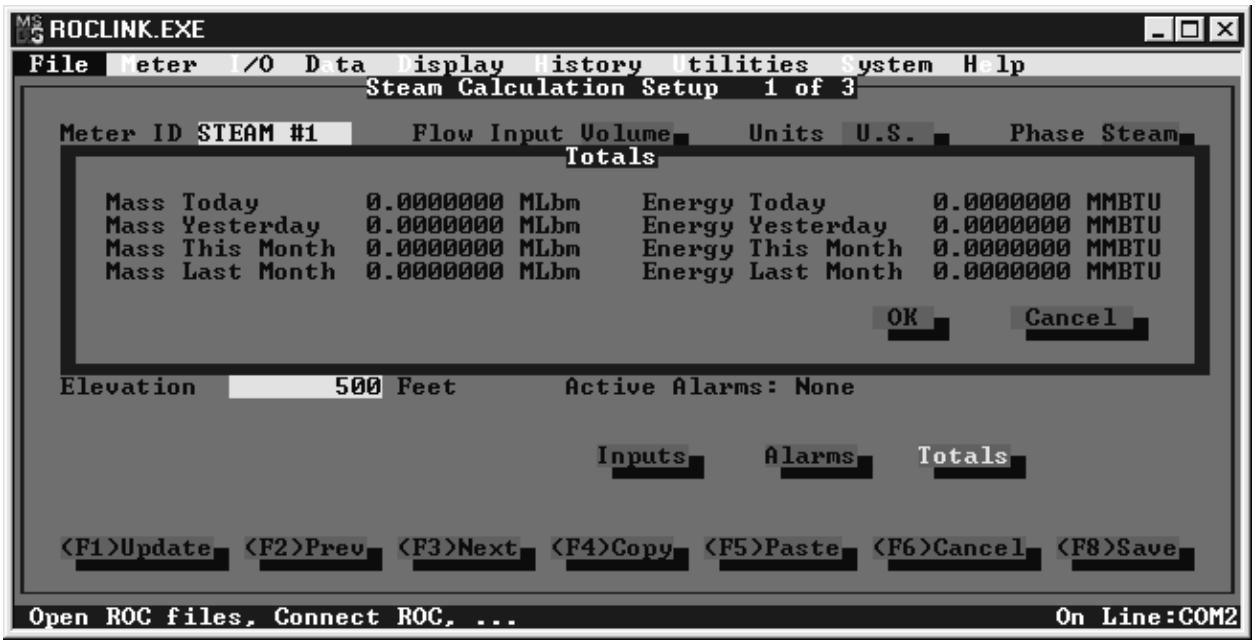

Figure 3-4. Totals Display

Mass Today — The total of mass flow so far in the current day, as calculated by this steam point. Units are in MLb (thousands of pounds) for steam, and in tons for water. When Metric units are selected, the unit of measurement is tonnes for both steam and water.

Mass Yesterday — The total of mass flow for the entire previous day, as calculated by this steam point.

Mass This Month — The total of daily mass flows so far in the current month.

Mass Last Month — The total of daily mass flows for the entire previous month.

Energy Today — The total of energy flow so far in the current day, as calculated by this steam point. Units are in MMBTU (millions of BTUs) for steam, and in MBTU (thousands of BTUs) for water. When Metric units are selected, the unit of measurement is MJ (megajoules) for both steam and water.

Energy Yesterday — The total of energy flow for the entire previous day, as calculated by this steam point.

Energy This Month — The total of daily energy flows so far in the current month.

Energy Last Month — The total of daily energy flows for the entire previous month.

APPENDIX A — POINT TYPE LISTING

Table A-1 shows the parameter definitions for the Steam point type, which is a User Data point tailored for the Steam/Water Thermodynamics application. For further descriptions of the parameters used in configuring the ROC/FloBoss, refer to Section 3 of this manual.

Table A-1. Point Type 27, Steam Flow Parameters

PARAM NUMBER	READ/ WRITE	VALID RANGE	DATA TYPE	LENGTH	DEFAULT VALUE	DESCRIPTION (UNITS FOR STEAM)
0	R/W	Printable ASCII characters, 0x20->0x7d	AC	10	STEAM #x, where x = 1+ logical number	Point Tag Id.
1	R/W	0->1	UC	1	0	Flow Input (0=Volume, 1=Mass, 2=Orif flange, 6=Orif DD2, 10=Orif Corner, 14=Nozzle, 18=Vent Mach, 22=Vent RW)
2	R/W	0->1	UC	1	0	Units Option (0=U.S., 1=Metric)
3	R/W	0->1	UC	1	0	Phase (0=Steam, 1=Water)
4	R/W	0->1	BIN	1	0	Pressure Option Bit 0= 0 - Absolute Bit 0= 1- Gauge Bit 1=0 – Upstream Bit 1=1 –Downstrm
5	R/W	0->1	UC	1	0	Atmospheric Pressure Option (0=Calculate, 1=Enter)
6	R/W	0->0xff	BIN	1	0	Alarming Mode Bit 6–SRBXonSet Bit 5-SRBXonClear Bit4-ALMEnable
7	R/O	0->0xff	BIN	1	0	Alarm Code Bit 6-NoFlowAlarm Bit 2-HighAlarm Bit 0-LowAlarm

PARAM NUMBER	READ/ WRITE	VALID RANGE	DATA TYPE	LENGTH	DEFAULT VALUE	DESCRIPTION (UNITS FOR STEAM)
8	R/W	0->1	UC	1	0	Steam Properties Recalculation Flag (1=Recalc)
9	R/W	0,0,0 or 3,x,14 or 5,x,13 or 5,x,17 or 16,x,2-11 or 17,x,2-21 or 31,x,11 or 31,x,15 or 31,x,17 or 31,x,19 where x is a valid point number for the given point type	TLP	3	0,0,0	Actual Meter Input Point (Volume Rate, Corrected Mass rate or Differential pressure)
10	R/W	Valid IEEE Floating Point Number	FLP	4	0	Actual Meter Value (ACFH or ACMH for Linear Meters, In Water at 68F or kPa for Differential press)
11	R/W	0,0,0, or 3,x,14 or 16,x,2-11 or 17,x,2-21 or 31,x,11 or 31,x,15 or 31,x,17 or 31,x,19 where x is a valid point number for the given point type	TLP	3	0,0,0	Pressure Input Point
12	R/W	Valid IEEE Floating Point Number	FLP	4	0	Pressure Value (PSI or kPa)
13	R/W	0,0,0, or 3,x,14 or 16,x,2-11 or 17,x,2-21 or 31,x,11 or 31,x,15 or 31,x,17 or 31,x,19 where x is a valid point number for the given point type	TLP	3	0,0,0	Temperature Input Point
14	R/W	Valid IEEE Floating Point Number	FLP	4	0	Temperature Value (°F or °C)
15	R/W	0,0,0, or 3,x,14 or 16,x,2-11 or 17,x,2-21 or 31,x,11 or 31,x,15 or 31,x,17 or 31,x,19 where x is a valid point number for the given point type	TLP	3	0,0,0	Steam Quality Input Point
16	R/W	0-100	FLP	4	100	Steam Quality Value (%)

PARAM NUMBER	READ/ WRITE	VALID RANGE	DATA TYPE	LENGTH	DEFAULT VALUE	DESCRIPTION (UNITS FOR STEAM)
17	R/W	0,0,0, or 3,x,14 or 16,x,2-11 or 17,x,2-21 or 31,x,11 or 31,x,15 or 31,x,17 or 31,x,19 where x is a valid point number for the given point type	TLP	3	0,0,0	Mass Flow Input Point
18	R/W	Valid IEEE Floating Point Number	FLP	4	500	Elevation (Feet or Meters)
19	R/W	Valid IEEE Floating Point Number	FLP	4	14.467	Atmospheric Pressure (PSI or kPa)
20	R/W	Valid IEEE Floating Point Number	FLP	4	0	Low Flow Alarm Limit (MLbm/hr or tonnes/hr)
21	R/W	Valid IEEE Floating Point Number	FLP	4	10,000	High Flow Alarm Limit (MLbm/hr or tonnes/hour)
22	R/W	Valid IEEE Floating Point Number	FLP	4	8	Pipe Diameter (inches or mm)
23	R/W	Valid IEEE Floating Point Number	FLP	4	4	Orifice Diameter (inches or mm)
24	R/W	Valid IEEE Floating Point Number	UC	4	0	Pipe Material Code (0 to 12)
25	R/W	Valid IEEE Floating Point Number	UC	4	0	Orifice Material Code (0 to 12)
26	R/W	Valid IEEE Floating Point Number	FLP	4	68	Pipe Measuring Temperature (°F or °C)
27	R/W	Valid IEEE Floating Point Number	FLP	4	68	Orifice Measuring Temperature (°F or °C)
28	R/O	Valid IEEE Floating Point Number	FLP	4	0	Steam Enthalpy (BTU/lbm or kJ/kg)
29	R/O	Valid IEEE Floating Point Number	FLP	4	0	Steam Density (lbm/ft3 or kg/m3)
30	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow Rate / Hour (MLbm/hr or tonnes/hr)

PARAM NUMBER	READ/ WRITE	VALID RANGE	DATA TYPE	LENGTH	DEFAULT VALUE	DESCRIPTION (UNITS FOR STEAM)
31	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow Rate / Day (MLbm/day or tonnes/day)
32	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow Rate / Hour (MMBTU/hr or MJ/hour)
33	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow Rate / Day (MMBTU/day or MJ/day)
34	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow Today (MLbm or tonnes)
35	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow Yesterday (MLbm or tonnes)
36	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow Today (MMBTU or MJ)
37	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow Yesterday (MMBTU or MJ)
38	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow This Month (MLbm or tonnes)
39	R/O	Valid IEEE Floating Point Number	FLP	4	0	Mass Flow Last Month (MLbm or tonnes)
40	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow This Month (MMBTU or MJ)
41	R/O	Valid IEEE Floating Point Number	FLP	4	0	Energy Flow Last Month (MMBTU or MJ)
42	R/O	Valid IEEE Floating Point Number	FLP	4	1.0	Coefficient of discharge
43	R/O	Valid IEEE Floating Point Number	FLP	4	0.1	Viscosity (cP)
44	R/O	Valid IEEE Floating Point Number	FLP	4	1.2	Isentropic exponent
45	R/O	Valid IEEE Floating Point Number	FLP	4	1.0	Expansion factor

If you have comments or questions regarding this manual, please direct them to your local sales representative or contact:

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